Chapter-3

Method and Procedures
CHAPTER 3

METHOD AND PROCEDURES

In this chapter, the method and procedures employed in the study have been described. The present study was designed to investigate the effectiveness of computer based multimedia instructional strategy on achievement in English language among the students of IX standard in relation to their academic anxiety and parents child relationship. The nature of the study led the investigator to design the experiment. So, the present study is empirical in nature, which relies on experience or observation alone. Thus, the design is data based, coming up with conclusions and capable of being verified by experiment, called experimental design -a powerful support possible for the given hypotheses based on the principles of replication, randomization and local control.

3.1. DESIGN OF STUDY

A research design is characterized by adjectives like flexible, appropriate, efficient, economical and so. The design, which minimizes bias and maximizes the reliability of the data collected and analyzed, is called a good design. The design, which gives the smallest experimental error, is supposed to be the best design in many investigations. A research design is a detailed plan of investigation; in fact it is the detailed procedure of testing the hypotheses and analyzing the obtained data. The research design thus
may be defined as the sequence of those steps taken ahead of time to ensure that the relevant data will be collected in a way that permits objective analysis of different hypotheses formulated with respect to research problems. In every investigation, there is a systematic procedure that is followed. The present investigation is experimental in nature following quasi-experimental method with pre-test and post-test equivalent group design.

This design is often used in classrooms when experimental and control groups are such naturally assembled groups as intact classes, which may be similar. Often in educational research, the researcher is not in a position to assign subjects randomly to treatment, while principals of the schools may be willing to make two classes available for testing. They are not likely to permit researchers to break the classes up and reconstitute them, rather, they intend them to be kept as intact groups. Under these circumstances, therefore, an experimenter may use pre-assembled groups, such as intact classes, for framing experimental and control groups. However, this design mandates the use of pre-test to demonstrate initial equivalence of the intact groups on dependent variables. If the pre-test scores of groups are not equivalent, the experimenter may proceed with the conduct of experiment by using the technique of analysis of variance to compensate for this lack of equivalency between the groups.
The present study involves three independent variables namely, teaching strategies, academic anxiety and parent-child relationship and one dependent variable i.e. achievement in English Language. To study the main effects and Interactional effects of independent variables of teaching strategies, academic anxiety and parent-child relationship on dependent variable of achievement in English language, technique of analysis of variance (ANOVA) was employed. The efforts here were directed to the question, “In what way and to what extent teaching strategies, academic anxiety and parent-child relationship with the cross classifications interact in affecting achievement in English language”. The answer to this question has been sought through the simple factorial (2X2) design and complex factorial design (2X2X2) analysis of variance (ANOVA).

As a requisite of factorial design of (2X2X2) ANOVA, incorporating in dependent variables of Teaching strategies, academic anxiety and parent-child relationship, the variable of teaching strategies was varied at two levels i.e. teaching through computer based multimedia instructional strategy and traditional (lecture) method of teaching through conventional strategy. Furthermore from each of these two levels of the groups having high and low academic anxiety were identified on the bases of mean scores. Again from each of the above cited four groups thus formed hostile
parent-child relationship HPCR and warm parent-child relationship WPCR.
In order to have global view of the results, the two strategies of teaching (MMS & TM) were compared for instructions on students’ achievement in English language, the design came out to be factorial design of (2X2X2) ANOVA.

The schematic layout of the factorial design (2X2X2) used in the present study is given below in figure 3.1.

(Schematic lay out of Factorial Design ANOVA)

<table>
<thead>
<tr>
<th>A Teaching Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>A&lt;sub&gt;1&lt;/sub&gt; (MMS)</td>
</tr>
<tr>
<td>B&lt;sub&gt;1&lt;/sub&gt; HAAL</td>
</tr>
<tr>
<td>C&lt;sub&gt;1&lt;/sub&gt; HPCR</td>
</tr>
<tr>
<td>C&lt;sub&gt;1&lt;/sub&gt; HPCR</td>
</tr>
<tr>
<td>C&lt;sub&gt;1&lt;/sub&gt; HPCR</td>
</tr>
<tr>
<td>C&lt;sub&gt;1&lt;/sub&gt; HPCR</td>
</tr>
</tbody>
</table>

Fig 3.1 Layout of 2X2X2 ANOVA
Description of the abbreviations used in arrangement:

A: Strategies of teaching
   A₁: Multimedia Strategy
   A₂: Traditional Method

B: Academic Anxiety
   B₁: High academic anxiety level
   B₂: Low academic anxiety level

C: Parent Child Relationship
   C₁: Hostile Parent Child Relationship
   C₂: Warm Parent Child Relationship

It is clear from the fig. 3.1 that the treatment variable of teaching strategies has been designated as A and its two strategies multimedia instructional strategy and traditional method (conventional strategy-control group) designated as A₁ and A₂ respectively.

The factor of academic anxiety is designated as B and its two levels as B₁ and B₂ corresponding to high and low academic anxiety level.

The factor of parent-child relationship is designated as C and its two levels as C₁ and C₂ corresponding to hostile and warm parent-child relationship.

The total number of combinations came out to be 2X2X2 = 8 as shown in figure 3.2
### TOTAL NUMBER OF COMBINATIONS FROM 2X2X2 ANOVA

<table>
<thead>
<tr>
<th>( A_1 ) (MMS)</th>
<th>( A_2 ) (TM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( B_1 )</td>
<td>( B_1 )</td>
</tr>
<tr>
<td>( B_2 )</td>
<td>( B_2 )</td>
</tr>
<tr>
<td>( C_1 ) ( A_1B_1C_1 )</td>
<td>( C_1 ) ( A_2B_1C_1 )</td>
</tr>
<tr>
<td>( C_2 ) ( A_1B_1C_2 )</td>
<td>( C_2 ) ( A_2B_1C_2 )</td>
</tr>
<tr>
<td>( C_1 ) ( A_2B_1C_1 )</td>
<td>( C_1 ) ( A_2B_2C_1 )</td>
</tr>
<tr>
<td>( C_2 ) ( A_2B_1C_2 )</td>
<td>( C_2 ) ( A_2B_2C_2 )</td>
</tr>
</tbody>
</table>

Fig. No. 3.2 showing total number of combinations from 2X2X2 ANOVA

### 3.2 SAMPLE

“Sampling is the fundamental to statistical methodology of research” - Varma, M.

In every research, the investigator has to prepare and select tools to collect the data. Since, the population under study is very large, hence, it is not possible for the investigator to collect data from the total population. Sampling is the procedure, which helps the investigator to collect data from the limited number of subjects selected from the population or universe.

There are several methods of sampling viz. simple random, systematic, multistage, stratific, cluster, repetitive, judgment and quota etc. In the
present study, sample was drawn from the population of all the IX standard students studying in Senior Secondary Schools of Hoshiarpur City of Punjab State during the session 2004-05. Sample was raised through random cluster sampling method. First of all four schools namely, Govt. Sen.Sec.School, Clock Tower; Govt. Senior Secondary School, Railway Mandi; D.A.V.Sen.Sec. School, Arya Samaj Road and P.D.Arya Mahila Sen.Sr. School, Mall Road, Hoshiarpur were randomly selected from the total population of schools. From each school two sections were randomly selected. Each of the section was randomly designated to group – I (MMS) and group-II (TM). Initially the sample consisted of 217 subjects, which was gradually reduced to 200 subjects to constitute the sample because 17 students could not take part in the complete experiment from pre-test to post-test. Among the sample of 200 students, group-I was comprised of 100 students and group-II was also comprised of 100 students.

All these students were pursuing the same course/syllabus of study under the same board of examination of the Govt. of Punjab with the same official medium of instruction for English grammar.

All of them were domiciles of Punjab; they were urban students. The school environment and school resources were same for both the groups as all the subjects were selected from urban schools of Hoshiarpur city of Punjab. For further experimentation,
the students were selected on the basis of academic anxiety and parent-child relationship within their groups.

Randomization in selection of sample, condition of a true experimental design could not be met, as it is there in educational researches involving so many human beings. It is not desirable to disturb the classes because changing the placement in different sections would create other difficulties. Besides this, during the experiment, students should not be subjected to a new or changed condition(s) as that may in any way affect them psychologically. Making the children conscious too can affect environmental conditions. Thus, the placement of students is rather kept intact. Keeping in view the availability, feasibility and objectives of the experiment intact, sections of IX standard were selected for the study in natural settings.

3.3 TOOLS USED

As per objectives of the study, to measure the subjects during pre-test and post-test on dependent variable and independent variables, following two types of tools were used i.e. measuring tools and instructional tools:

I) MEASURING TOOLS

1. Academic Anxiety Scale for children (DR. A.K. SINGH & DR. (KM) SEN GUPTA –1986) was employed to measure the level of academic anxiety.
2. Parent-child Relationship Scale By DR. NALINI RAO-1989 was employed to measure the relationship of the students with their parents.

3. An Achievement Test to measure the achievement in English language (grammar) developed by the investigator was employed as pre-test & post-test.

II) INSTRUCTIONAL TOOLS

A CD-ROM titled SCHOOLROM EDUCATIONAL CD-ROMS for English grammar has been developed by STARDOTSTAR Computers India Pvt. Ltd. situated at A6, Basement, Gemini Parsn Complex, Chennai-6.

3.4 DESCRIPTION OF TOOLS

3.4.1 ACADEMIC ANXIETY SCALE FOR CHILDREN (AASC)

Academic anxiety scale developed by DR. A.K.SINGH AND DR. (KM) A. SEN GUPTA was employed to test the level of academic anxiety (state anxiety) of the children relating to the impending danger from the environment of the academic institute and the subject like English or Mathematics.

This scale has been developed for use with school students of age range, 13-16 years (class VIII TO XI) the preliminary form of the academic anxiety scale of children had 30 items. After carrying out item analysis based upon Kelley technique (1939), only, 20 items (with yes or no responses) were retained and reviewing
10 were dropped. According to the manual after establishing the rapport, the instructions printed on the test were read by the researchers. There was no fixed time limit for test of high anxiety and low anxiety but it was assured that the answers given by children should be kept confidential. The reliability of the test was computed through two methods, i.e. test-retest methods and the split-half method administered on 100 pupils. The test had been validated against the Sinha anxiety test, Neuroticism scale of MPI and CAAT. Former two tests are the measures of general anxiety and the latter intend to measure academic anxiety among school children. The following table presents the validity coefficient of AASC against these different measures.

**TABLE 3.4.1.**
(VALIDITY COEFFICIENT OF AASC)

<table>
<thead>
<tr>
<th>Test</th>
<th>Criterion</th>
<th>Correlation Coefficient</th>
<th>N</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Anxiety Scale</td>
<td>Neuroticism Scale</td>
<td>.31*</td>
<td>100</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>(AASC)</td>
<td>Sinha Anxiety Scale</td>
<td>.41*</td>
<td>100</td>
<td>&lt; .01</td>
</tr>
<tr>
<td></td>
<td>CAAT</td>
<td>.57*</td>
<td>100</td>
<td>&lt; .01</td>
</tr>
</tbody>
</table>

* Significant

On the basis of the obtained correlation coefficients, it can be said that academic anxiety scale for children is a valid test.
3.4.2 PARENT CHILD RELATIONSHIP SCALE

The parent-child relationship scale was employed to test the relationship of the children with their parents. This test was based particularly on the following two principles under laying a study of parental factors.

1. That the parents act differently towards their children depending on the sex of the child is a common observation; and
2. Patterns of socialization differ according to social cultural process factor.

The variables of reward and punishment used in the laboratory studies have been successfully adopted in the process of socialization. A wide range of the studies has focused warmth as a predominant variable and Sera’s attempts (24) at identifying this factor as concern for the children and parent-child harmony only reflects the various forms of warmth behaviour.

After an extensive survey of available literature and research data in the area, the functional concepts of ten parents child relationship dimension were operationally defined and adopted for quantitative measures through assessable behavioral situations. One hundred and fifty items (150) with 15 items under each dimension were administered on 544 students in the age group of 12 to 18 years studying in standard 7 through 12. Item correlation further structured the
scale format to one hundred items (100) evenly distributed over the ten dimensions of the scale. The data available on the item of the scale was grouped into fairly universal dimensions of children's experience of family interaction with the two parent factor. The tool contained 100 items categorized into ten dimensions namely, protecting, symbolic punishment rejecting, object punishment, demanding, indifferently symbolic reward, loving, object reward and neglecting. Each respondent scores the tool for both Father and Mother separately.

The PCR scales were administered on different language sample group for establishing concurrent validity of the scales. The coefficient of correlation on the tests of Hindi-English and English-Kannad concurrent form of PCR scales were found to be significant at .01 percent level of confidence. The reliability of the test was completed through test-retest method. Coefficients of correlation on ten Parent-child Relationship dimension of FATHER and MOTHER forms.
Table No 3.4.2 and 3.4.2. (a) show the reliability and validity of the scale.

**TABLE 3.4.2**

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Dimensions (Sub-scale)</th>
<th>Father form</th>
<th>Mother form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Boys N=96</td>
<td>Girls N=98</td>
</tr>
<tr>
<td>1.</td>
<td>Protecting</td>
<td>.871</td>
<td>.832</td>
</tr>
<tr>
<td>2</td>
<td>Symbolic punishment</td>
<td>.809</td>
<td>.840</td>
</tr>
<tr>
<td>3.</td>
<td>Rejecting</td>
<td>.816</td>
<td>.783</td>
</tr>
<tr>
<td>4.</td>
<td>Object punishment</td>
<td>.864</td>
<td>.771</td>
</tr>
<tr>
<td>5.</td>
<td>Demanding</td>
<td>.784</td>
<td>.792</td>
</tr>
<tr>
<td>6.</td>
<td>Indifferent</td>
<td>.792</td>
<td>.770</td>
</tr>
<tr>
<td>7.</td>
<td>Symbolic reward</td>
<td>.782</td>
<td>.842</td>
</tr>
<tr>
<td>8.</td>
<td>Loving</td>
<td>.775</td>
<td>.813</td>
</tr>
<tr>
<td>9.</td>
<td>Object reward</td>
<td>.807</td>
<td>.863</td>
</tr>
<tr>
<td>10.</td>
<td>Neglecting</td>
<td>.825</td>
<td>.871</td>
</tr>
</tbody>
</table>

Table 3.4.2 (a) show the reliability and validity of the scale.

**TABLE 3.4.2. (a)**

Coefficient of correlation on Hindi- English and Kannad-English forms of PCR scales

<table>
<thead>
<tr>
<th>PCR Scale</th>
<th>Concurrent forms of PCR Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>English-Hindi N= 75</td>
</tr>
<tr>
<td>1. Father form</td>
<td>Ranged from .731 to .812</td>
</tr>
<tr>
<td>2. Mother form</td>
<td>Ranged from .688 to .721</td>
</tr>
</tbody>
</table>
3.4.3. ACHIEVEMENT TEST OF ENGLISH LANGUAGE

The achievement test (used as pre-test and post-test) was developed and standardized by the investigator with the help of his guide, which was used to measure the achievement of the concepts. The test was developed to evaluate the knowledge of the students, understanding and application of the concepts of English grammar, covered by the concept chosen for the study. The maximum marks of the test were 40 for 40 items rearranged into 8 parts according to the types of test items i.e. selecting right or wrong, identifying true or false, making simple sentences, filling in the blanks, underlining the correct answer, matching the column and multiple choice questions.

The reliability of the test was found by test-retest method.

The validity of the test was tested on the basis of criterion of content validity. The validity of the content was found out by relating it to the objectives of the test. The entire concepts taught, were covered in the test.

3.4.4 INSTRUCTIONAL TOOLS

This CD-ROM is auto played when inserted in CD Drive on PC and opens in the Windows operating system with the title page having three aspects of multimedia i.e. text, audio and graphics. This page shows as.... ‘Loading.......... Please wait’, and demands the command to click. By clicking, the second page is
loaded categorically showing the developer's phone nos. fax nos. correspondence address, e-mail address, website etc. The third page shows the contents (i.e. The noun, Adjective, Adverb, Pronoun, inductive Grammar) enumerated 1 to 5 and for more information, next command is required. By clicking on the caption 'more' ; the next page of the contents (i.e. Determiners, Tenses, Non-Finites, Connectors, Comparisons) enumerated 6 to 10 is loaded, bearing captions a.) 'back' b.) 'more' and c.) 'EXIT'.

By clicking on the contents one by one, the learner is free to learn through interactive media by question-answer technique. Multiple choice type questions appear on the pages along with the captions like 'Home', 'Score', and 'Time' under the title of the particular chapter.

The learner can learn at his/ her own pace by clicking on the choices given under the particular question. If the learner clicks on the right choice, the audio effect happens sounding 'Yes it is!' or 'You got it!' or 'Excellent!' followed by a tick mark (✓) caption and if the learner clicks on the wrong option, then a cross mark (✗) appears on the screen of the monitor followed by the sound effect as 'No, its wrong', giving immediate feedback and the correction is done automatically with announcement in the speech wizard- 'the right answer is.... and thus, the whole sentence is pronounced in a right way. Each chapter is comprised of at least 30
questions related to the subject matter, and each question is given ten seconds to attempt. If the learner does not interact or respond within the given time period, the right answer automatically appears on the screen. Item-wise scoring of each chapter gets displayed on the counter after every attempt and as such the learner gauges his/ her potential confidently and credulously.

3.5 PROCEDURE

The procedure of this study involved selection of students for treatment group and experimentation. The following procedure was adopted to conduct the experiment:

Phase-I (Pre-test Phase)

In this phase, achievement test academic anxiety scale for children and parents child relationship scale were administered to the whole sample. Both these groups were administered these tests one by one as per norms and instructions contained in their manuals.

Phase-II (Experimental Phase)

In this phase, assignment of strategy of instruction was done randomly. Group-I was taught through computer based multimedia instructional strategy (i.e. through CD-ROM-English grammar) and Group-II through traditional method (i.e. verbalism generally). The lesson based on these methods of teaching were planned from their course of study in
English Grammar at IX standard level. Often, the importance of content matter of subject is underplayed in the research, yet it is not to be lost sight of. The content dealt with during teaching learning process is of central importance. Hence, care was taken of this fact also. Same topics of English Grammar (i.e. Noun, Adjective, Adverb, Tense, Sentence and kinds of sentence were taught to both the groups.

As it has already been specified, English grammar for the IX standard students studying in the various school of Hoshiarpur City, was the subject matter for the investigation. But owing to the limitation in every type of material and also owing to the environment in which the experiment was to be conducted, the following aspects were kept in mind while selecting the subject matter for the study.

1. The topics chosen for the investigation were such as suited the nature of two approaches of instruction, i.e. computer based multimedia instructional strategy and traditional method verbalism in general.

2. It was thought that introducing such topics, the student would take interest in learning the different aspects of English grammar through different approaches.

3. The experiment was started in the beginning of the session i.e. mid March, 2004 to February, 2005.
4. The topics selected were also according to the student's prerequisite knowledge so that stated terminal behaviour could be attained. On the basis of these prerequisites, the decisions taken for the selection of the material taught through multimedia strategy and traditional method were as follows:

a. The learners were in a position to understand the material presented in English.

b. The learners were supposed to possess certain information related to the topics of English grammar taken for the experiment.

c. Standardized CD-ROM was used for instruction.

In the present study, the subject matter - the chapters of English grammar - was selected from the following contents:
Investigator himself conducted the treatment in both the groups (i.e. students were given instructions through lecture method and through CD-ROM interactive media at their own pace along with immediate corrections of terms used in English grammar as per their syllabus) so as to avoid teacher's variable and to maximize precision.  

Phase-III (Post Test Phase)

In this phase, immediately after the treatment was over, the subjects of the whole sample were administered the achievement test (the same which was used in pre-test) as post-test.
### TABLE 3.4.4
THE SCHEMATIC LAYOUT OF THE PROCEDURE FOLLOWED TO CONDUCT THE STUDY:

<table>
<thead>
<tr>
<th>Phase</th>
<th>N = 100</th>
<th>N = 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group A1</td>
<td>Group A2</td>
</tr>
<tr>
<td>I- Pre Test</td>
<td>1. Achievement Test as Pre-Test</td>
<td>1. Achievement Test as Pre-Test</td>
</tr>
<tr>
<td></td>
<td>2. Academic Anxiety Scale by Dr. S.K. Singh &amp; Dr. A. Sen Gupta</td>
<td>2. Academic Anxiety Scale by Dr. S.K. Singh and Dr. A. Sen Gupta</td>
</tr>
<tr>
<td>II- Instructional Stage</td>
<td>4. Students will be given instructions through multimedia strategy [i.e. CD-ROM Multimedia]</td>
<td>Students will be given instructions through Conventional strategy [i.e. verbalism generally]</td>
</tr>
<tr>
<td>III-Post-Test</td>
<td>5. Achievement Test as Post-Test</td>
<td>Achievement Test as Post-Test</td>
</tr>
</tbody>
</table>

### 3.6 DATA COLLECTION:

The tools mentioned under caption 3.3 were employed for data collection. In the present study the data was collected keeping in view the objectives of the study. The data concerning achievement test was collected on two separate occasions. One was pre-test (before the treatment) which was called as occasion I and another was post-test (just after the treatment) called as occasion II.
(a) PHASE-I

The first phase was the pre-test stage. Before the conduct of experimentation, the students of each of the treatment and control groups were administered the achievement test. The scores of this test were termed as pre-test scores.

(b) PHASE-II

The second phase was the treatment phase. The students of treatment group were given instruction through multimedia strategy i.e. educational CD-ROM concerning the various contents of English grammar, taught at secondary school level.

(c) PHASE-III

The third phase was the post-test stage. Immediately after the treatment, the students were again administered the same Achievement test as post-test. The scores thus collected were termed as post-test scores.

To test the anxiety, Academic Anxiety Scale for Children developed by Dr. S.K. Singh and Dr. A. Sen Gupta was administered to the whole sample (G-I & G-II). However, before the actual administration of the test, instructions were read out to students as given in the manual. Since there was no fixed time limit for the test, the students were allowed to take 10 to 15 minutes ordinarily to complete the test. The scores, thus collected were termed as Academic Anxiety score which
divides the students in two groups on the basis of scores at two levels high scores and low scores.

To test the father form and mother form relationship with the students, Parents Child Relationship Scale developed by Dr. Nalini Rao was administered to both the groups. The questionnaire comprising 100 questions called consumable booklets were distributed among the students. Before the actual administration of the test, the instructions were again read out one by one to students as mentioned in the manual of the test. The scores thus collected were termed as PCR scores at two levels: hostile relationship score and warmth relationship scores.

The data thus collected comprised the following sets of scores in all:

- Pre-Test score of Achievement in English Language.
- Academic Anxiety raw score.
- Parent-Child Relationship raw scores.
- Post-Test scores of Achievement in English Language.
- Gain scores

### 3.7 SCORING OF TESTS

After collection of data, the scoring of all the tests used as tools was done as per scoring keys mentioned in their manuals.
3.7.1 SCORING OF AASC: Academic Anxiety Scale for Children:

The scoring of AASC was done according to the manual's instructions & Key. The maximum possible score of this test was 20. In academic anxiety scale for children, each item of the test was scored as either +1 or 0. There were two types of items: positive and negative. Positive items which were endorsed by the subject as YES and all negative items No 4, 9, 16 & 18 which were endorsed by subject as NO were given a score of +1. A score of zero was awarded to all other answers. Thus, high score on the test indicated high academic anxiety and low score on the test indicated low academic anxiety.

3.7.2 SCORING OF PCRS

Scoring of Parent Child Relationship Scale was also done accordingly to the instructions given in the manual and key. The maximum possible scores of this scale were 1000. In PCRS, each item of the test was scored according to five point rating scale for both the forms -FATHER FORM and MOTHER FORM given as under:
Responses were required to be filled in the columns under FATHER and MOTHER for each statement in accordance with the behaviour of their parents with the subjects:

If you see it Always Mark 5 in the columns
If you see it Many Times Mark 4 in the columns
If you see it some times Mark 3 in the columns
If you see it rarely Mark 2 in the columns
If you see it Very rarely Mark 1 in the columns

For example

MY FATHER MY MOTHER

2     1. Let me off easily when I do wrong 4
4     2. Shows interest in my school work 3

All the 100 questions in the questionnaire were further categorized in 10 dimension (sub-scales) for the purpose of scoring. Total score of sub-scales i.e. PRO, SP, REJ, DEM, IND, SR, LOV, OR AND NEG indicated the raw score for deciding the warmth relationship and hostile relationship, out of 100x10 marks. Total PCR score = (Fatherly Form + Motherly form)

Scoring of achievement test was done according to a handmade scoring key. The responses on achievement test as pre-test and post-test were scored separately. The total number of right responses were taken as the total score of students out of maximum possible scores.
which was 40 for given eight full-fledged questions with their sub-sets. Gain score was the result of the score of post-test minus the score of pre-test.

Post-test scores – Pre-test scores = Gain scores

3.8 PRECAUTIONS OBSERVED

Following precautions were observed during the course of the experiment (pre-test - treatment - post-test) for ensuring effectiveness and high precision in experimental conditions, which may have contributed to results:

1. All the subjects were oriented to the tests and respective methods of teaching as per their treatment in the beginning of the experiments.
2. No undue stress or control of any kind was imposed on the subjects at any time during the study, and the experiment was conducted in the relaxed natural setting.
3. Testing as well as teaching was simultaneous in the two groups to avoid interaction.
4. The effectiveness of the experimental treatment was ensured by establishing rapport and by liaison in the schools, maintaining natural settings, harmonious atmosphere, providing sufficient time for various activities in the experimentation and like.
5. All the subjects were taught by the investigator himself to avoid any variation in teacher variable.
6. It was ensured that the topics taught to the students had not been previously taught through P.K. Testing and not even taught by any other teacher during the experiment to any of the group.

7. Care was taken not to undermine the importance of the content matter or subject matter.

8. Separate material was provided to every student during experimentation so as to avoid any disturbance or chances of unfair observation. Thus, it was ensured that the material provided to the students for testing, treatment or during experiment was sufficient to meet their requirements.

3.8 STATISTICAL TECHNIQUES AND ANALYSIS USED

Keeping in view the design and objectives of the study, the following statistical techniques were employed to analyze the collected data. The rational for using the particular techniques have been given in the following paragraph.

1. Appropriate descriptive statistics such as mean, median, standard deviation, skewness and kurtosis were worked out and to ascertain the nature of the distribution of scores on dependent variables of achievement in English language (pre-test, post test and gain score) and independent
variables of academic anxiety and parent child relationship.

2. Test was employed to see the individual effectiveness of methods of teaching on achievement in English language.

3. Analysis of variance (2X2X2 ANOVA) was employed to study the main effects and Interactional effects of the variables under study.

4. In the case of teaching strategies, where F-ratio was found to be significant, t-ratio was calculated.

5. Tabulation and graphical representation wherever necessary were done. Results were interpreted with the help of mean scores computed from gain scores of teaching strategies.

3.9 IDENTIFICATION OF VARIABLES

3.9.1 Independent Variables-----------------------------

Multimedia Strategy and Traditional Method

3.9.1 (a) Classifying Variables -------------------------

Academic Anxiety Scale for Children and Parent Child Relationship Scale

3.9.2 Dependent Variables -----------------------------

Achievement in English Language (Grammar)

3.9.3 Criterion Variable-------------------------------

Use of English Grammar

3.9.4 Intervening Variables--------------------------

Socio-economic status, scholastic achievement, prior knowledge, teacher, school, physical environment etc.
The study persuaded the following Viz. independent, dependent and intervening variables. The explanation of these variables is given in the proceeding captions:

3.9.1 INDEPENDENT VARIABLES:

These were the variables, which were manipulated in order to see their effect on achievement in English language. These were three independent variables:

1. Strategies of teaching (MMS Vs TM)
2. Academic anxiety
3. Parent-child relationship

The experimental treatments had two strategies of teaching (a) computer based multimedia instructional strategy (b) conventional strategy i.e. general verbalism. In the first strategy CD-ROM (School ROM) comprising structured audio commentary along with visual text media was presented for instructions and in the second method i.e. traditional method, a rigid, stereotype method was adopted for presentation of matter

CLASSIFYING INDEPENDENT VARIABLES

A) Academic Anxiety: (High Vs Low) The variable of academic anxiety of the students varied at two levels- High academic anxiety and low anxiety level.

B) Parent-Child Relationship: (Hostile Vs Warmth) The variable of parent-child relationship of the students
varied in two ways- Hostile relationship and warmth relationship.

3.9.2 DEPENDENT VARIABLES:

Testing phases

The efficiency of different treatments was assessed on two phases Viz before the experiment designated as pre-test (phase I) and immediately after the experiment designated as post-test (phase-II)

Efficiency of different treatments was assessed on different criteria, which were termed as dependent variables: Achievement score of students.

In order to see the effect of the treatment, the main factor, which was taken into consideration, was gain score of the students. This was measured by Achievement test, which was used on two different phases as follows:

1. Before the experiment started, the students of IX standard were administered an achievement test. The scores of this test were termed as pre test score.
2. Achievement test was again administered immediately after the experiment. The scores of this test were terms as post-test scores.

3.9.3 CRITERION VARIABLE

In the achievement test use of English grammar was termed as criterion variable
3.9.4 INTERVENING VARIABLES:

Certain variables could not be measured directly, but they had an effect on the outcome of the students. In the present study, there were many intervening variables that could be considered e.g., socio-economic status, scholastic achievements, prior knowledge of the topic, teacher, school, physical environment of classroom etc. Some of these variables were either controlled experimentally or were adjusted statistically or equalized by the way of controlling them.

3.10 STEPS TAKEN TO CONTROL INTERVENING VARIABLES

The intervening variables and the controls employed have been discussed variable wise in the proceeding paragraphs:

1. SCHOLASTIC ACHIEVEMENT: Eight sections were selected at random. So, the initial difference due to scholastic difference among the students of eight sections (if any) was controlled through random selection.

2. PRIOR KNOWLEDGE ABOUT THE SUBJECTS:
The Achievement Test was administered as pre-test on the subjects in different groups prior to the experimentation. The score on the pre-test were taken into consideration during analysis of data.

3. CONTAMINATION EFFORT: This effort was of two types. First, the effort due to exchange of ideas by the students in different treatment groups
about the content to be learnt and the method to be adopted to teach the content. The first effort occurred because the students of different treatment groups in the same section exchange ideas about the content learnt and the manner in which the content was presented. This effort was controlled by restricting the students to meet the students of other group. The students were further requested not to make any home study on the topics during the period of test administration. In order to further verify that his request was followed, the researcher enquired about it from the students.

4. **TEACHER BEHAVIOUR:** The experiment was conducted by the investigator himself to all the treatment groups. Hence inter-teacher variation was eliminated. He himself made the test analysis prepared the achievement test and revised the material on the basis of individual, group and field tryout etc. Moreover, the investigator himself gave instructions to the entire treatment group.

5. **SCHOOL BEHAVIOUR:** The schools selected for the experimentation were the aided and Govt. School. The school having more or less same physical environment. Thus the school environment could not be taken as an intervening variables.
6. **PHYSICAL ENVIRONMENT OF THE CLASS**: The physical environment was the same for all the groups with all the physical facilities such as ventilation and light arrangement etc.

3.11 **EXPERIMENTAL CONTROLS USED**

Every possible attempt was made to control those factors which could create bias. First, the investigator himself provided treatments to all the groups. It is generally believed that the competence and attitude of the investigator might affect the treatment efforts. It was therefore, to control the inter-group variation in different treatment groups that the investigator himself conducted experiment on all the groups. Secondly, the investigator tried to maintain the sympathetic and encouraging attitude towards all the groups in order to have a constant socio-cultural climate during the experiment. Thirdly, the measuring devices were based on behavioural objectives so that the devices could be the source of bias. Fourthly, every effort was made to maintain the experimental conditions similar in all experimental groups.